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7/10/02

HT-01-022

February 25, 2002

To: Commissioner of Patents and Trademarks
Washington, D.C. 20231

Fr: George O. Saile, Reg. No. 19,572
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Subject: Serial No. 10/050,644 01/16/02

Min Li et al.

FeTa NANO-OXIDE LAYER AS A CAPPING LAYER FOR ENHANCEMENT OF GIANT MAGNETORESISTANCE IN BOTTOM SPIN VALVE STRUCTURES

Grp. Art Unit: 2832

INFORMATION DISCLOSURE STATEMENT

Enclosed is Form PTO-1449, Information Disclosure Citation In An Application.

The following Patents and/or Publications are submitted to comply with the duty of disclosure under CFR 1.97-1.99 and 37 CFR 1.56. Copies of each document is included herewith.

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231, on March 1, 2002.

Stephen B. Ackerman, Reg.# 37761

Signature/Date Stephen B Ackerman 3/1/02

U.S. Patent 6,222,707 to Huai et al., "Bottom or Dual Spin Valve Having a Seed Layer that Results in an Improved Anti-ferromagnetic Layer," teaches a method on which a seed layer is used to provide an improved texture for an antiferromagnetic layer grown upon it.

U.S. Patent 6,181,534 to Gill, "Antiparallel (AP) Pinned Spin Valve Sensor with Specular Reflection of Conduction Electrons," teaches a method for forming a magnetoresistive spin valve sensor element in which copper and nickel oxide specular reflection layers are formed on each other and over a free magnetic layer.

U.S. Patent 6,208,491 to Pinarbasi, "Spin Valve with Improved Capping Layer Structure," teaches the formation of a capping structure comprising layers of CoFe and Ta or, alternatively CoFe, Cu and Ta, which improves the magneto-resistive performance subsequent to long periods of time at high temperatures.

In Swagten et al., "Specular Reflection in Spin Valves Bounded by NiO Layers," IEEE Transactions on Magnetics, Vol. 34, No. 4, July 1998, pp. 948-953, report on achieving increased electron reflectivity by an insulating NiO layer that is used to exchange bias a spin valve.

In Swagten et al, "Enhanced giant magnetoresistance in spin-valves sandwiched between insulating NiO," Physical Review B, Vol. 53, No. 14, 1 April, 1966, pp. 9108-9114, also report on the enhanced GMR effects obtained when sandwiching Co/Cu/Co and Ni80Fe20/Cu/Ni80Fe20 between layers of NiO.

Y. Kamiguchi et al., "CoFe Specular Spin Valve GMR Head Using NOL in Pinned Layer," Paper DB-01, Digest of Inter-magnetic Conference 1999, report on a spin valve structure in which the pinned layer contains a nano-oxide layer (NOL) which enhances specular electron scattering.

J.C.S. Kools, et al., "Magnetic Properties of Specular Spin-Valves Containing Nano-Oxide Layers," IEEE Trans. on Magnetics, Vol. 37, No. 4, July 2001, pp. 1783-1785, discusses the specular reflection enhancing properties of NOL layers used in the free ferromagnetic layers and in the pinned ferro-magnetic layers of spin valve structures using antiferro-magnetic pinning layers.

Y. Huai et al., "Highly Sensitive Spin-Valve Heads with Specular Thin Oxide Capping Layers," Paper EB-14, Digest of MMM/Intermag. 2001 Conference, p. 263, discuss the specular reflection enhancing effects of thin oxide capping layers used in bottom synthetic specular spin-valve structures.

U.S. Patent 6,175,476 to Huai et al., "Synthetic Spin-Valve Device Having High Resistivity Anti Parallel Coupling Layer," provides a bottom spin valve sensor having two antiparallel pinned layers coupled by a high resistivity rhenium layer that reduces shunt current through the three-piece pinned layer while still retaining adequate coupling between the two antiparallel layers.

U.S. Patent 5,731,936 to Lee et al., "Magnetoresistive (MR) Sensor with Coefficient Enhancing that Promotes Thermal Stability," teaches the formation of an MR sensor having a capping layer that can be either a Ta layer, an NiFeCr layer, an NiCr layer, an NiCr/Ta layer, or a Ta/NiCr layer.

U.S. Patent 5,637,235 to Kim et al., "Shaped Spin Valve Type Magnetoresistive Transducer and Method for Fabricating the Same Incorporating Domain Stabilization Technique," provides a bottom spin valve sensor having a Ta capping layer of between 0-100 angstroms thickness to protect the upper surface of the top ferromagnetic layer.

Sincerely,

Stephen B. Ackerman

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